

Bendix® AH-1B™ Air Hydraulic Intensifier

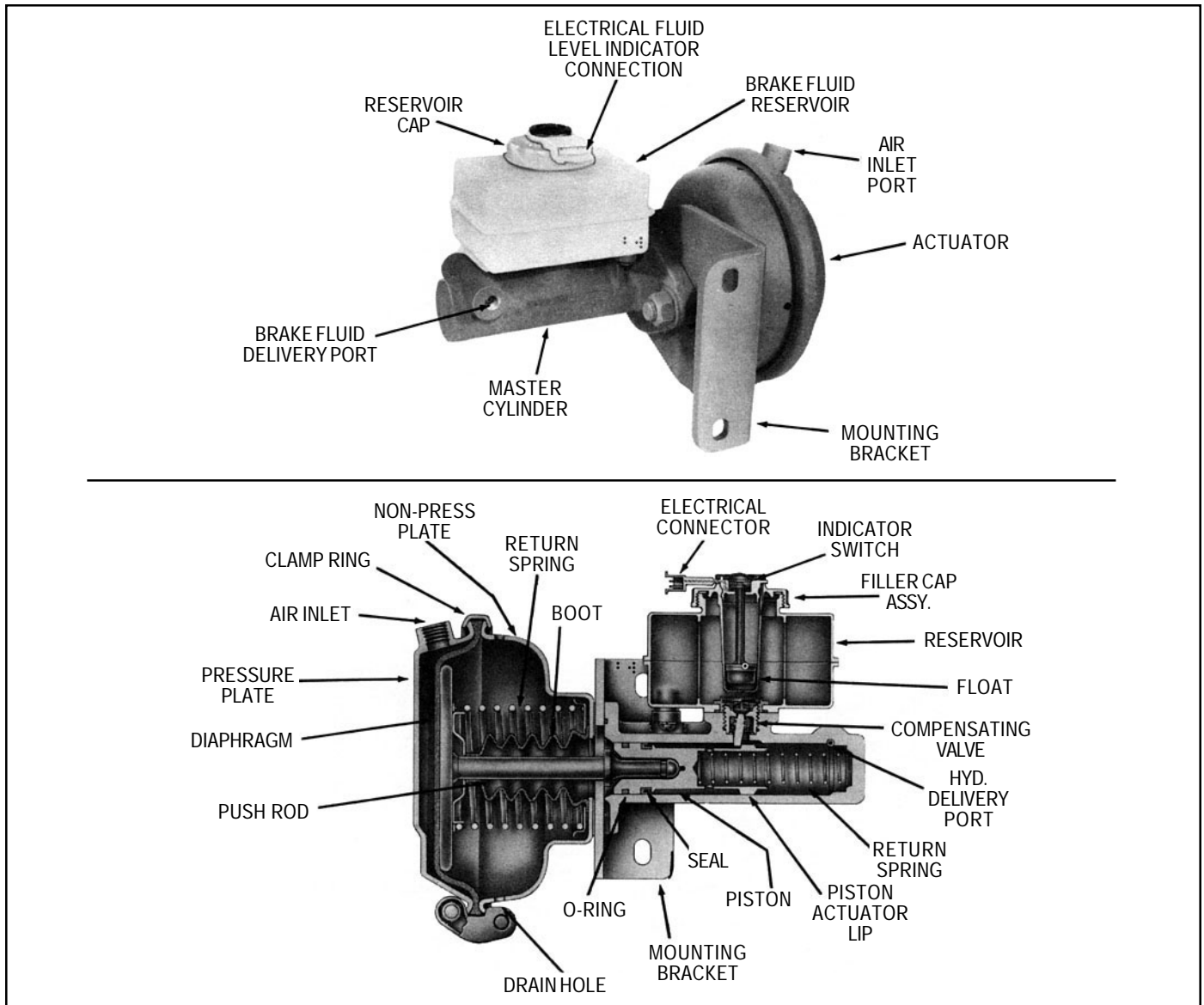


FIGURE 1

DESCRIPTION

The AH-1B™ air hydraulic intensifier is a hydraulic brake, power booster which utilizes compressed air for its power assist. Its function is to convert air pressure to hydraulic pressure for use in the brake system.

The AH-1B™ intensifier consists of three major component groups; a specially designed type 30 air actuator is bolted to a single piston master cylinder which incorporates an

integral brake fluid reservoir. A bracket installed between the actuator and master cylinder provides a means for mounting.

A float actuated, low fluid level, on/off electrical switch is incorporated in the reservoir filler cap assembly. A two “prong” connector is provided to permit the installation of a vehicle electrical cable assembly. Switch actuation occurs when the reservoir fluid level drops below the “minimum” level marking on the reservoir.

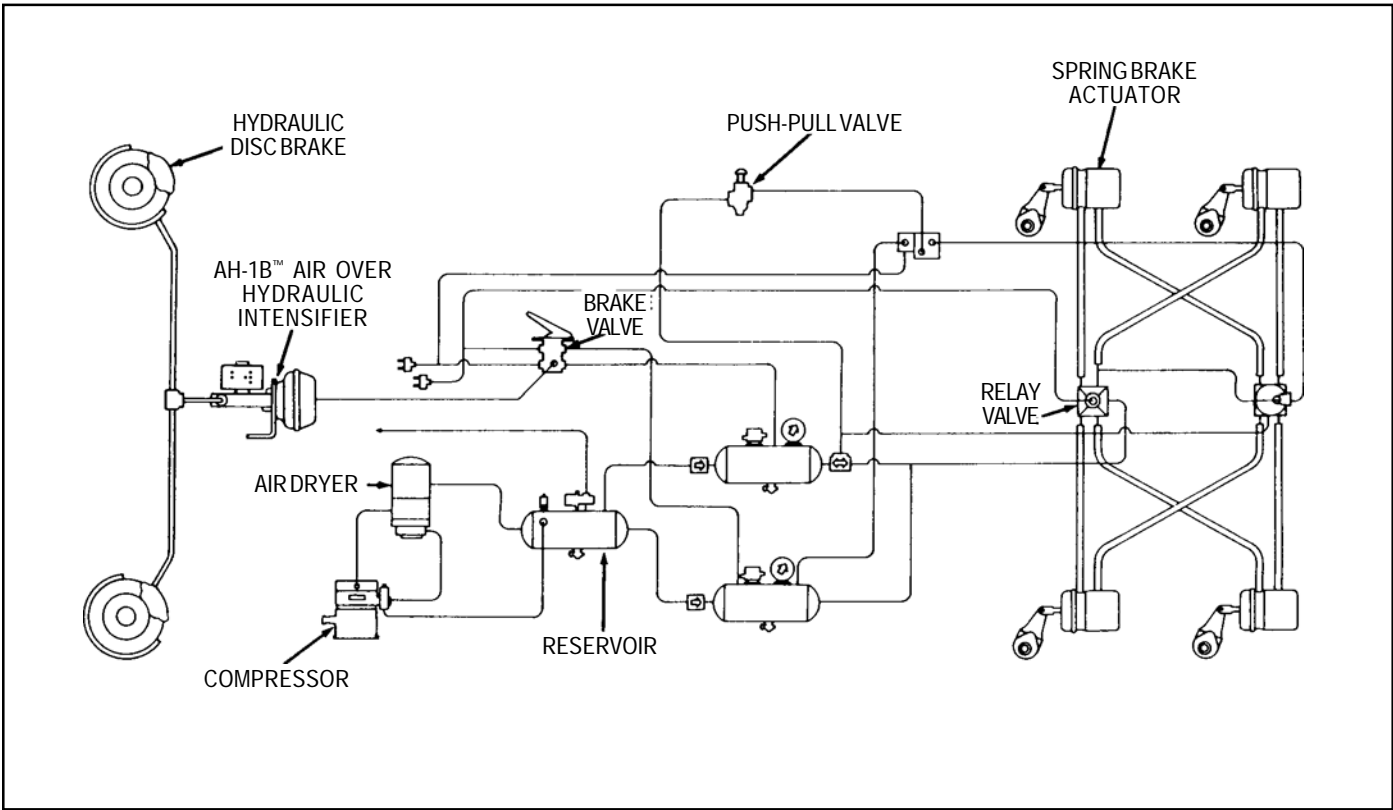


FIGURE 2 - TYPICAL AH-1B™ AIR HYDRAULIC INTENSIFIER SYSTEM

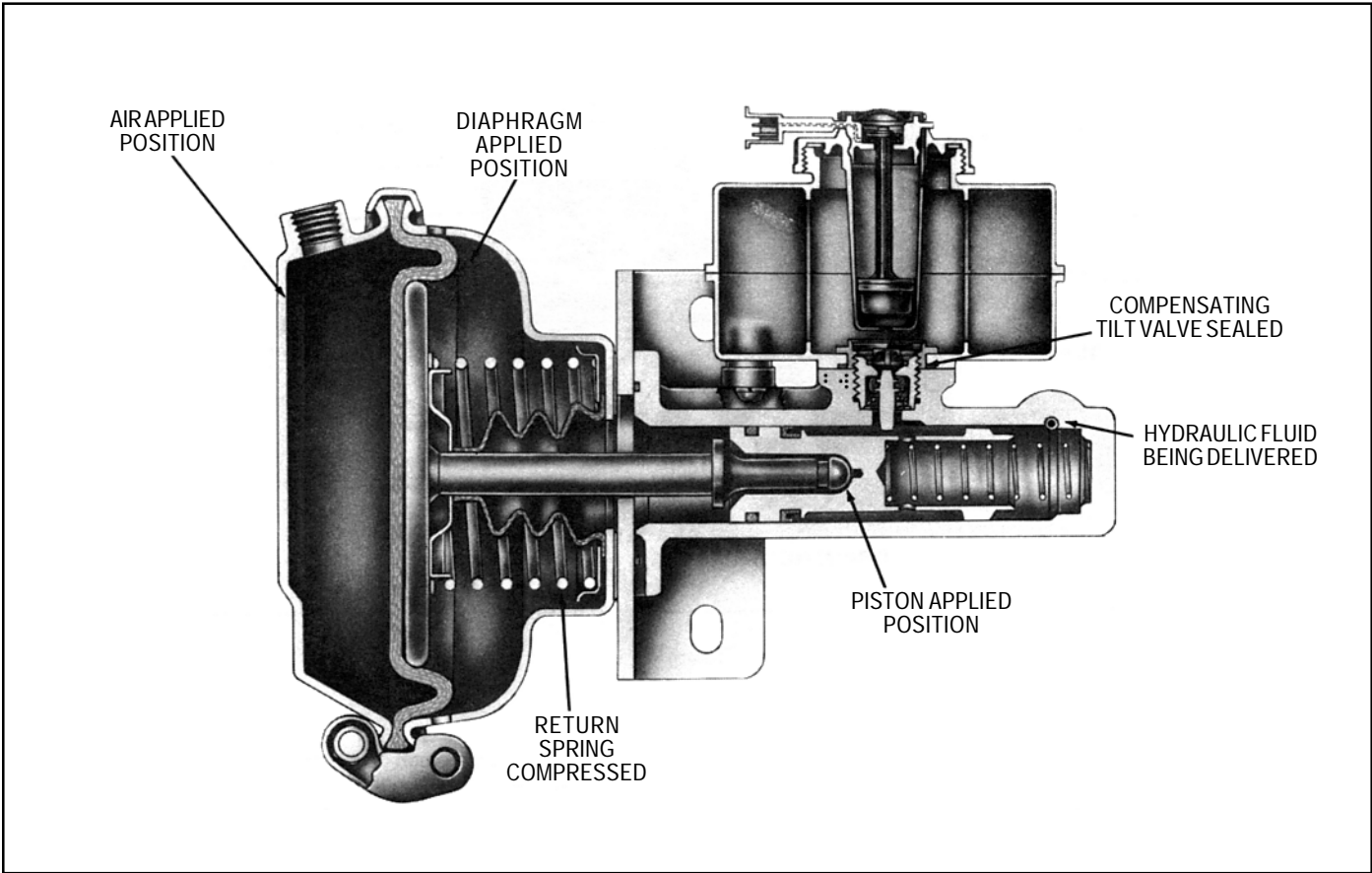


FIGURE 3 - CUTAWAY VIEW OF APPLIED POSITION

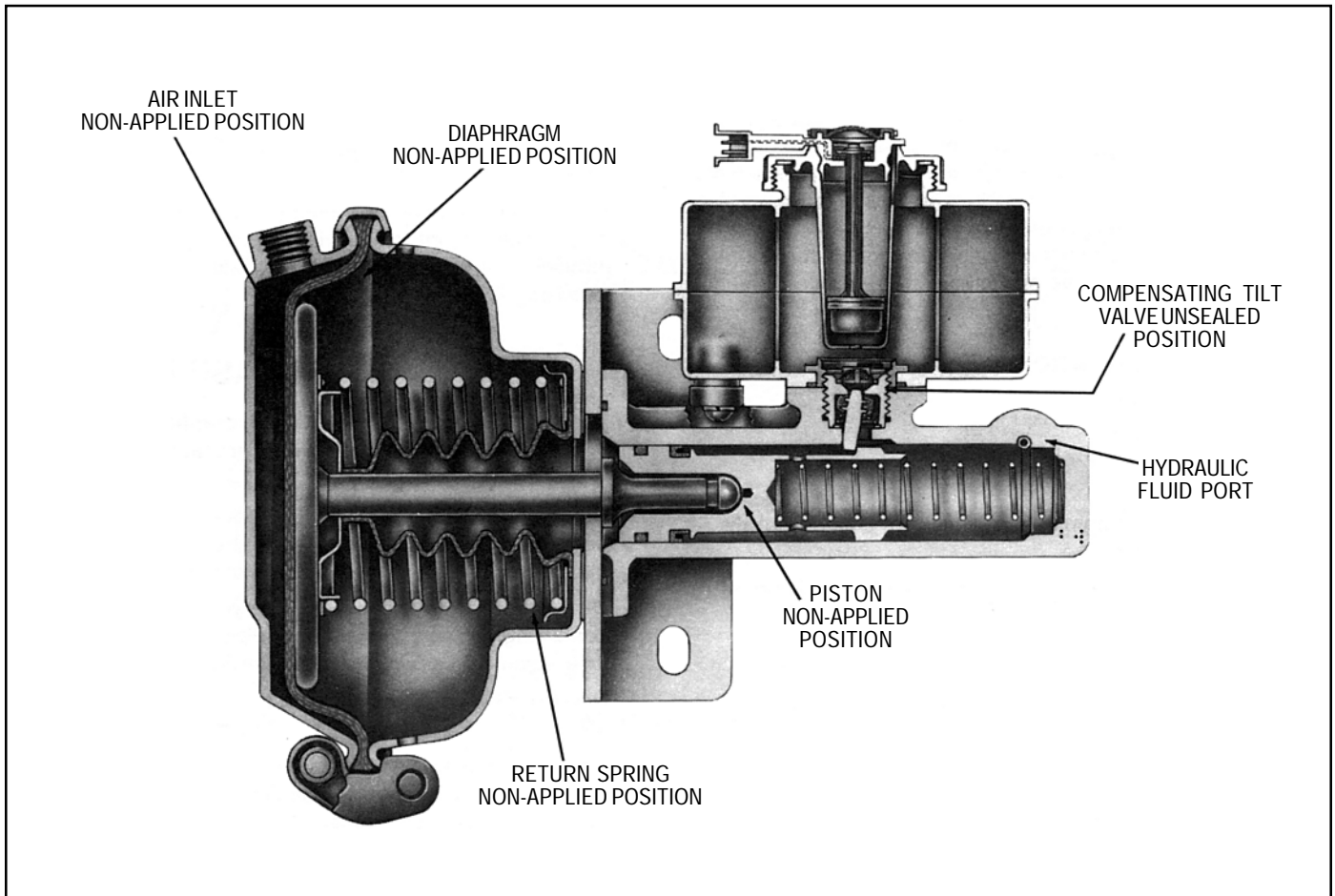


FIGURE 4 - CUTAWAY VIEW OF RELEASED POSITION

OPERATION

Brakes Applied

During a brake application, modulated air pressure from the foot operated air brake valve enters the actuator inlet port. Air pressure acting upon the area of the actuator diaphragm causes the diaphragm and push rod assembly to move toward the master cylinder. The actuator push rod forces the master cylinder piston to move within its bore. Initial forward travel of the piston moves the actuating lip of the piston away from the stem of the compensating (tilt) valve allowing it to close due to spring force. (Refer to Figure 2 & 3.) Closure of the compensating valve shuts off the fluid passage between the cylinder bore and fluid reservoir which allows hydraulic pressure to build and the brakes to apply. The amount of hydraulic pressure generated is dependent upon the air pressure applied to the air actuator.

Brakes Released

When air pressure is exhausted from the actuator the push rod returns to the released position due to spring force. With the push rod load removed, fluid pressure combined with return spring force causes the piston to return to the brakes released position. The actuator lip of the piston contacts the stem of the compensating valve and unseats

the valve as the piston returns. When the compensating valve opens, the passage between the fluid reservoir and master cylinder bore is also open. Any excess fluid remaining at the end of the stroke due to "pumping" and/or volume change due to temperature fluctuation is transmitted back to the fluid reservoir as the compensating valve opens. The push rod is used as the piston stop in the fully released position. (Refer to Figure 4).

Fluid Level Indicator

The reservoir fluid level is reduced as the brake linings wear due to an increase of fluid volume required in the hydraulic brake system. The float contained in the reservoir filter cap assembly is suspended in the reservoir fluid and responds to changes in the fluid level. As long as the reservoir fluid level is adequate, a metal contact plate on top of the float stem is held away from two electrical contacts. When the reservoir fluid level drops below the "MINIMUM" fluid level mark on the reservoir, the contact plate on the float stem will move and complete the electrical circuit through the switch.

TECHNICAL SPECIFICATIONS

AH-1B™ Air Hydraulic Intensifier Assembly

Power ratio - 20.2 to 1

Weight - approximately 2-1/2 pounds

Air Actuator

Effective area of diaphragm at 2-1/8 inches of push rod stroke - approximately 28 sq.in.

Volume at 2-1/8 inches of push rod stroke - approximately 75 cubic inches.

Master Cylinder

Bore diameter - 1.38 inches

Maximum piston stroke - 2-1/8 inches

Maximum fluid displacement - 3.17 cubic inches

Fluid Reservoir

Volume - 33.5 cubic inch to "MAXIMUM" level mark with cap removed.

PREVENTIVE MAINTENANCE

Every month, after 8,000 miles, or 300 operating hours;

1. Remove accumulated dirt and grime from the area around the reservoir cover. With the ignition switch in the on position, remove the cover and hold in an upright position and allow brake fluid in the tube of the cap to drain back into the reservoir. Check to see if the low fluid indicator bulb is operating (in cab of vehicle).
2. If the fluid level is low, fill to proper level indicated on the side of the reservoir. CAUTION: Fill the reservoir with type and grade of fluid recommended by the vehicle manufacturer.
3. Check tightness of the mounting nuts, air and hydraulic fittings.
4. Make a visual inspection of air and hydraulic lines for kinking, bending or fraying. Replace as necessary.

Every 12 months; 100,000 miles; or 3,600 operating hours;

1. Perform the operating and leakage tests. Replace or repair components or assemblies as indicated using only genuine Bendix parts.

OPERATING AND LEAKAGE TESTS

1. With vehicle air system pressure built to governor cut-out, make and hold a full brake application. Hold for at least 5 minutes. Using a soap solution, check for air leaks at fittings and air lines. Tighten and/or replace as necessary. Apply a soap solution around the actuator clamp ring. No leakage is permitted. Tighten or replace as necessary. Apply a soap solution to the actuator non-pressure plate drain holes. Replace the actuator diaphragm if leakage is detected.

2. While holding the brake valve in the fully applied position, check for hydraulic fluid leaks at all fitting connections and at the hydraulic cylinders in the foundation brake. Check for fluid leakage at the drain holes of the actuator non-pressure plate. Repair or replace components as necessary.
3. With the reservoir filter cap removed apply and fully release the brakes several times while observing the fluid in the reservoir. CAUTION: WEAR SAFETY GLASSES AS FLUID MAY EXIT THE RESERVOIR.
A slight fluid turbulence should be noted at the beginning of the application and should immediately cease. If prolonged turbulence is noted, the master cylinder must be repaired or replaced.

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around brake systems and components, the following precautions should be observed at all times:

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels. When working around or under the vehicle, stop the engine and remove the key from the ignition. Always keep hands away from chambers as they may apply as system pressure drops. Always wear safety glasses.
2. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, extreme caution should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components.
3. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to the use of those tools.
4. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
5. If the vehicle is equipped with an air over hydraulic brake system or any auxiliary pressurized air system, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with an AD-IS™ air dryer system or a dryer reservoir module, be sure to drain the purge reservoir.
6. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or pipe plug unless you are certain all system pressure has been depleted.
7. Never exceed manufacturer's recommended pressure.

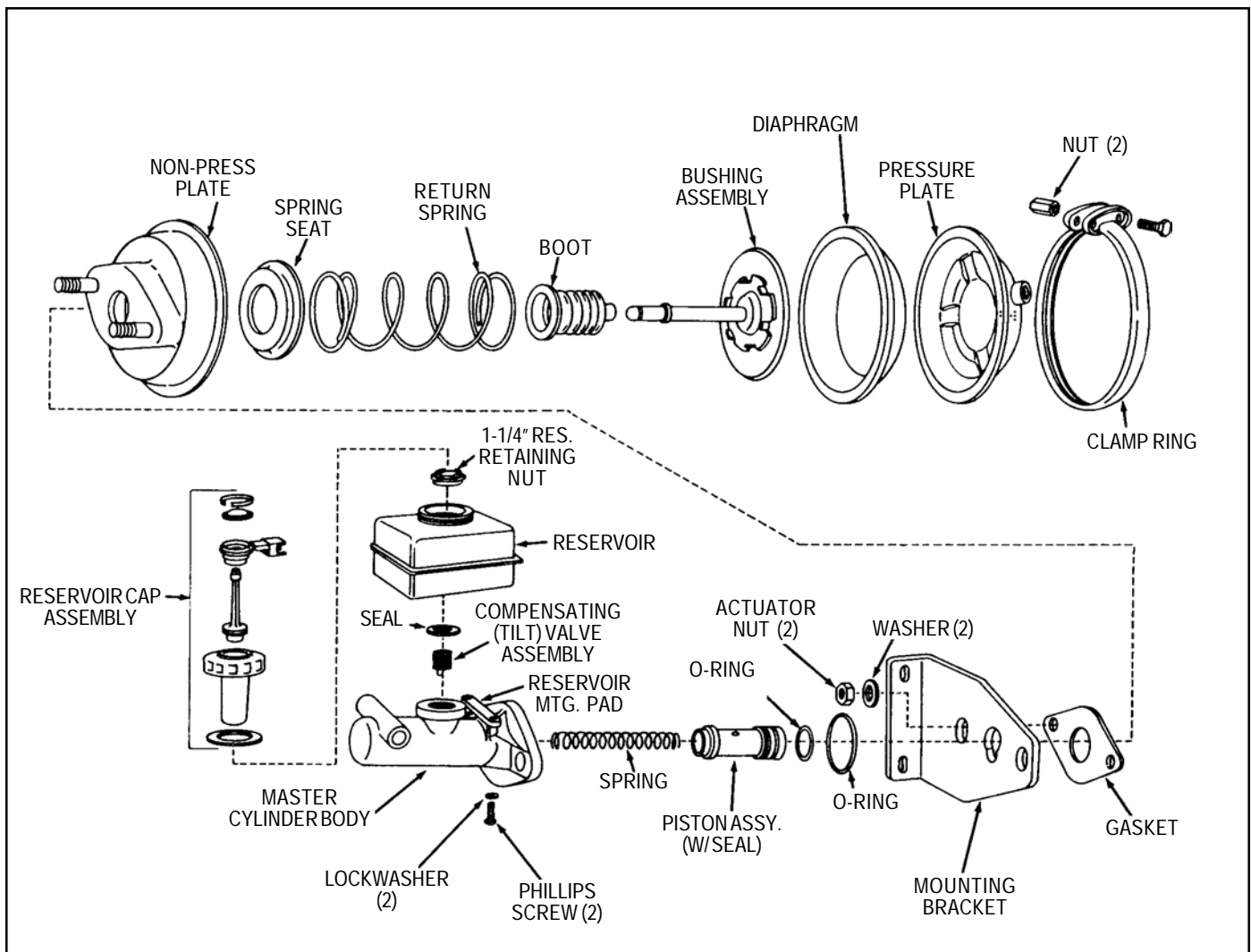


FIGURE 5 - EXPLODED VIEW

8. Never attempt to disassemble a component until you have read and understand all recommended procedures. Some components contain powerful springs and injury can result if not properly disassembled. Use only proper tools and observe all precautions pertaining to use of those tools.
9. Use only genuine Bendix® replacement parts, components and kits.
 - A. Use only components, devices and mounting and attaching hardware specifically designed for use in hydraulic brake systems.
 - B. All replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as the original equipment.
10. Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
11. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.

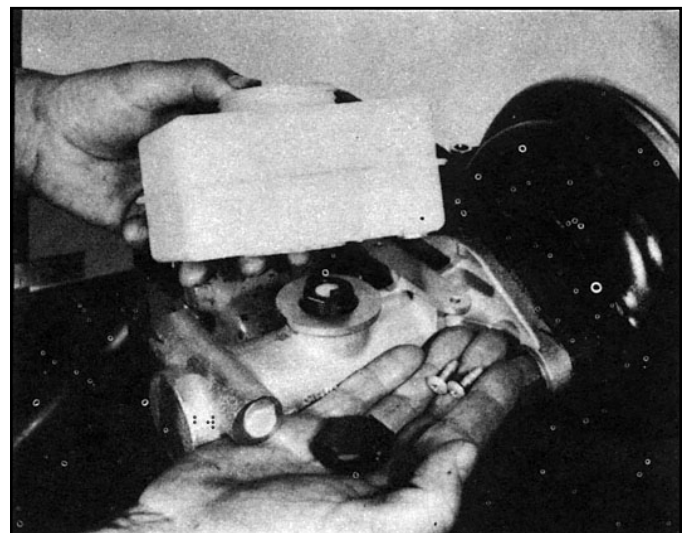


FIGURE 6

REMOVAL FROM VEHICLE

1. Disconnect the hydraulic line from the delivery port of the master cylinder and plug the line. Allow the hydraulic fluid from the master cylinder to drain into a suitable container. Remove reservoir cover to facilitate drainage.
2. Disconnect the air line from the air actuator and cover the end of the air line.
3. Remove the electrical connection from the low level indicator on the reservoir cover.
4. Remove the hardware that secures the mounting bracket of the AH-1B™ intensifier to the vehicle and remove the complete unit.

INSTALLING ON VEHICLE

1. Install the hardware which secures the AH-1B™ intensifier mounting bracket to the vehicle. Torque all hardware per the vehicle manufacturer's recommendations.
2. Reconnect the air line to the actuator. Use a small amount of thread sealant.
3. Reconnect the hydraulic line to the master cylinder.
4. Connect the electrical terminal from the low fluid indicator onto the terminal on the cap of the reservoir.
5. Fill the master cylinder fluid reservoir using the type and grade fluid specified by the vehicle manufacturer.
6. Bleed the hydraulic brakes following the vehicle manufacturer's recommended procedure.
7. Refill the master cylinder fluid reservoir to replace fluid lost during the bleeding procedure.

DISASSEMBLY

General

The following procedure is presented for reference only. Disassembly of the AH-1B™ intensifier should not be attempted without having the appropriate maintenance kits or replacement parts on hand as some parts may be damaged during disassembly.

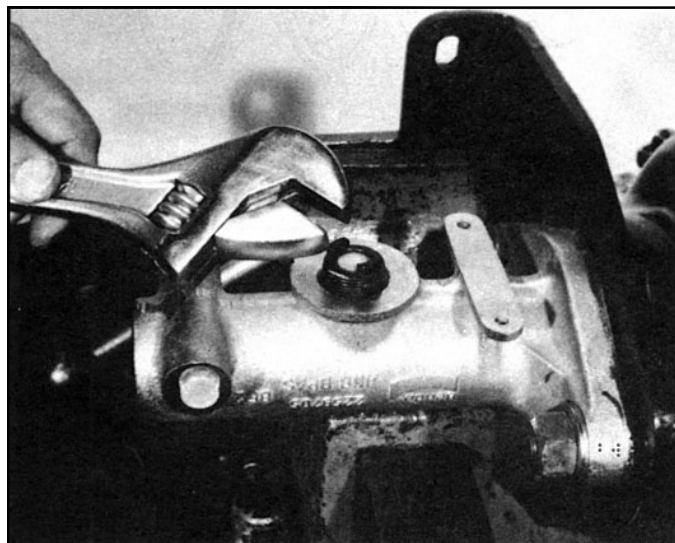


FIGURE 7

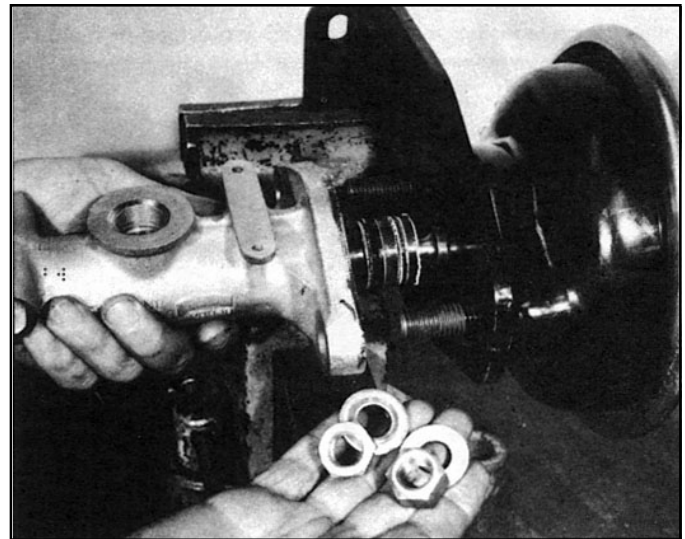


FIGURE 8

1. Drain the hydraulic fluid from the reservoir.
2. Remove the two Phillips screws and lockwashers from the bottom of the reservoir located at the reservoir mounting pad on the master cylinder next to the flange.
3. Remove the reservoir cap and retain. **DO NOT DISASSEMBLE CAP.** Using a 1-1/4" socket remove the retaining nut on the inside of the reservoir. Reservoir is now free of the master cylinder. Remove the seal on the bottom of the reservoir and discard. (Refer to Figure 6.)
4. Remove the compensating valve assembly from the master cylinder by placing a crescent wrench across the flats and turning counterclockwise. If only changing the reservoir, do not remove the compensating valve assembly as it cannot be replaced unless the master cylinder is disassembled. The compensating valve must be replaced as an assembly (Figure 7).

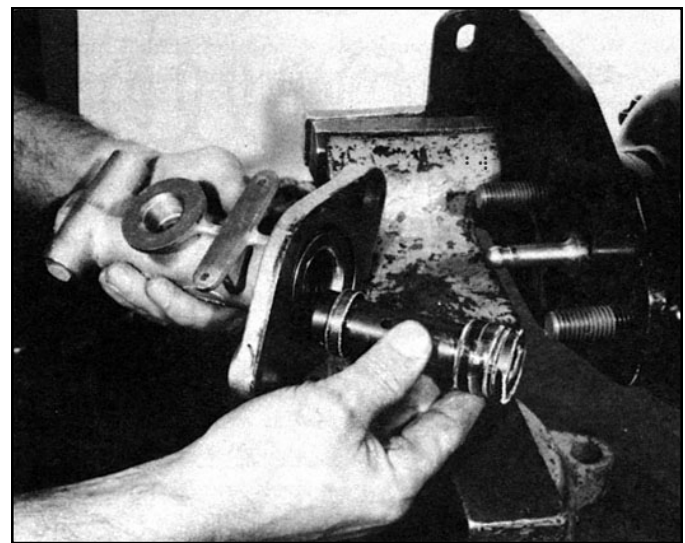


FIGURE 9

5. Note and mark the orientation of the actuator and master cylinder to the mounting bracket. Remove the two nuts and washers from the mounting studs of the actuator (use a 15/16" socket wrench). Separate the master cylinder and actuator from the mounting bracket and retain the actuator for later disassembly. CAUTION: Piston under spring load and retained by the push rod only when compensating tilt valve assembly has been removed. (Refer to Figure 8.)
6. Remove the o-ring from the flange of the master cylinder and the gasket between the bracket and actuator.
7. Remove the piston assembly and spring from the body of the master cylinder. (Refer to Figure 9.)

Actuator Disassembly

8. Mark the relationship of the clamp ring, pressure and non-pressure plates. Remove the two nuts and bolts from the clamp ring of the actuator (use a 1/2" socket wrench). Grasp the ears of the clamping ring and spread slightly until ring will come off and pressure plate and non-pressure plates separate. CAUTION: Parts are spring loaded. Use a press or clamp to retain the push rod and return spring during disassembly.
9. Remove the spring seat, spring, and boot from the push rod and separate the diaphragm from the push rod. (NOTE: Do not separate the diaphragm from the push rod.) If the diaphragm is to be replaced, a new push rod and diaphragm assembly will be required.

CLEANING & INSPECTION

1. Wash all master cylinder parts retained during disassembly in clean DOT 3 or 4 brake fluid. CAUTION: DO NOT use any solvent other than clean brake fluid for cleaning or flushing master cylinder parts. The use of unapproved solvents with a trace of mineral oil will damage rubber parts.
2. Remove all sediment or foreign material from the bottom of the fluid reservoir. If the reservoir is equipped with filters, make certain they are thoroughly cleaned. If the filters are thoroughly plugged and/or cannot be cleaned, the entire brake system should be flushed. If the filter cannot be cleaned, it may be removed after the system is flushed.
3. Inspect the condition of the piston. Measure the major diameter (around the top edge of the o-ring groove and piston actuator lip) of each piston in several places around its circumference. The difference between the largest and smallest measurement on each of the diameters measured should not exceed .005 inches (.13mm). If the diameter of the piston varies more than the maximum, the master cylinder should be replaced or repaired using a maintenance kit.

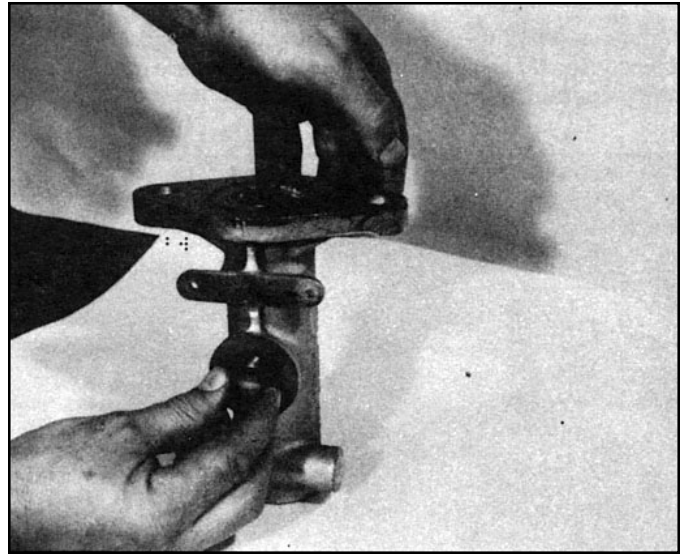


FIGURE 10

4. Examine the master cylinder bore after cleaning. If pitting, scratching or visible wear patterns are noted, the master cylinder should be replaced. Dirt, gum and stained areas not removed during cleaning can be polished with crocus cloth. DO NOT USE EMERY CLOTH OR SAND PAPER. Master cylinder bores may be honed provided that the diameter is not increased substantially. Honing to remove scratches and pitting will most likely increase the bore diameter beyond the sealing ability of piston seals. To make certain the bore diameter has not been excessively increased, measure the piston clearance in the master cylinder bore. Using a feeler gauge make certain the clearance does not exceed .010 inches (.25 mm). Make certain that no burrs or sharp edges remain in the cylinder bore. Thoroughly clean and rinse the master cylinder in brake fluid after polishing or honing.
5. Inspect the actuation push rod return spring for corrosion and pitting and replace if necessary.
6. Inspect the actuator diaphragm for wear and abrading. (It is recommended that the diaphragm be replaced whenever a complete disassembly of the AH-1B™ intensifier takes place.)
7. The push rod boot should be replaced each time a complete disassembly is undertaken.

ASSEMBLY

Actuator Assembly

1. Install the boot onto the push rod assembly. The small I.D. of the boot must be forced over the larger O.D. on the shaft of the push rod. Place the spring over the push rod and boot and place the spring seat onto the spring. Force large flange end of the boot through the center hole of the spring seat.

2. Place the push rod and diaphragm assembly into the pressure plate and place non-pressure plate onto the push rod. Check to assure that the spring is in proper position (each end contained and centered in the spring guides).
3. Orient the pressure and non-pressure plates as marked and compress the spring by pushing down on the non-pressure plate. Retain with a clamp or light pressure from a press. Be sure the ferrule on the pressure plate is properly oriented and the edges of the non-pressure plate, diaphragm, and pressure plate are equally distributed around the entire circumference.
4. Install clamping ring and retain with the two bolts and nuts. Torque to 130-150 inch pounds. **IMPORTANT:** Be sure the beads of the pressure plate and the non-pressure plate are contained by the clamping ring a full 360°. Tap around the circumference of the clamp ring to assure it is seated evenly all around.
5. Install a new gasket on the mounting studs of the nonpressure plate of the assembled actuator and put the assembly aside.

Master Cylinder Assembly

6. Install new o-rings on the master cylinder mounting flange and the master cylinder piston.
7. Carefully insert the spring and piston into the master cylinder body. Making certain not to damage the seal and o-ring. The lip seal and o-ring must enter the body last. Depress and hold the piston by inserting a dull object into the recess in the end of the piston. Piston actuator lip should be completely past the compensating TRT valve assembly port to allow for proper installation of the compensating valve assembly. Install the compensating valve assembly into the threaded port of the top of the master cylinder. Be sure compensating valve is installed between the two larger diameters on the piston. Torque to 30-40 foot pounds. **NOTE:** The compensating valve assembly should retain the piston assembly in the master cylinder if installed correctly. (See Figure 10.)
8. Install a new seal on the bottom of the reservoir and place both on the master cylinder. Be sure reservoir is oriented so that holes for the Phillips screws line up with the holes on the master cylinder. Install the two Phillips screws and lockwashers and tighten snugly.
9. Install the reservoir retaining nut onto the compensating valve through the reservoir cover opening. Use a 1-1/4" socket and torque to 13-16 foot pounds.
10. Install the reservoir filler cap assembly on the reservoir.
11. Clamp the mounting bracket securely in a vise, making sure it is oriented so that the unit may be assembled, and lining up the marks made prior to disassembly.

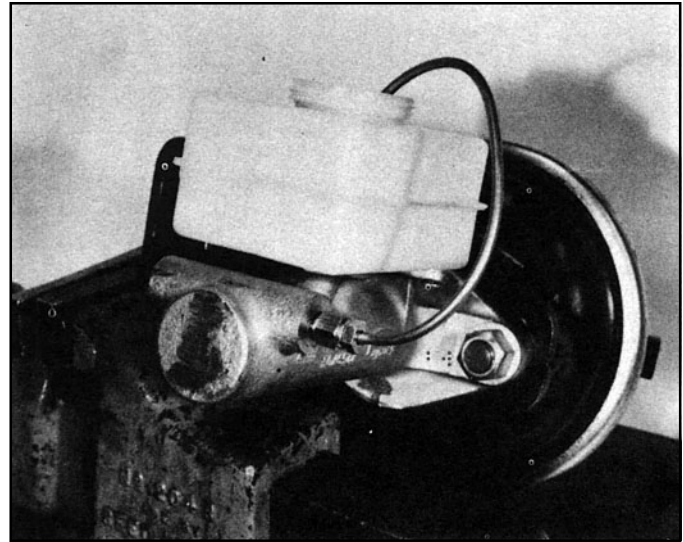


FIGURE 11

12. Install the new gasket(6) over the mounting studs of the brake chamber. Make sure the gasket is flat against the top of the brake chamber.
13. Place the brake chamber onto the mounting bracket with the push rod extending through the center hole and the mounting bolts extending through the outer holes.
14. Install the master cylinder/reservoir assembly onto the brake chamber mounting studs and retain with nuts(4) and washers(5). Torque to 100-115 foot pounds. **NOTE:** The end of the push rod must enter the recess of the master cylinder piston.

Bench Bleeding

Before installing the AH-1B™ intensifier assembly on the vehicle the master cylinder should be bench bled. Follow the vehicle manufacturer's recommendations in lieu of the following.

1. Plug outlet port and secure cylinder in a vise with front end tilted slightly downward. **NOTE:** Bleeder tubes or Bendix bleeding kit #74013 may also be used following the kit instructions enclosed. (Refer to Figure 11.)
2. Fill reservoir with brake fluid. Refer to vehicle manufacturer's manual for fluid requirements.
3. Apply and release air pressure to the actuator several times.
4. Re-position the master cylinder in the vise with the front end tilted slightly up. Again, apply and release air pressure several times. **NOTE:** When using this method of bench bleeding, the master cylinder will not be capable of being stroked once all the air is removed.
5. Install the AH-1B™ intensifier on the vehicle and perform the "Operating and Leakage Tests" prior to placing the vehicle in service.